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ABSTRACT

Student background factors and college entry factors which might predict performance on the Florida Teacher Certification Examination (FTCE) were examined. The predictor variables, lower- and upper-level grade point average (GPA), American College Testing (ACT)-English, ACT-Math, ACT-Social Science, ACT-Natural Science, and ACT-Composite, were examined for their relationship to performance on the FTCE-Math, FTCE-Reading, FTCE-Professional Practices, and FTCE-Writing tests. Also examined was the relationship of race, sex, type of lower level college (community versus four-year college), educational major, and campus where degree was completed (Tampa versus regional campus) to FTCE performance. The sample included 400 University of South Florida graduates. Pearson correlations showed ACT-Composite and ACT-Social Science to be the best overall predictors of FTCE performance, and lower-level GPA the poorest. With the predictor variables at hand, stepwise regression accounted for the most variance for criterion variables, FTCE-Math and FTCE-Reading. It accounted for the least variance for the criterion, FTCE-Writing. A cross-validation being a random split on the population of scores produced R-squared values comparable to those generated for the entire population, thereby confirming the accuracy of the regression results reported. (Author/PN)

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The Use of Student Background Variables, ACT Scores and GPA to Predict Performance on The Florida Teacher Certification Examination

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The Use of Student Background Factors and College of Education Entry Factors to Predict Performance on the Florida Teacher Certification Examination

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The purpose of study was to examine student background factors and College of Education entry factors which might predict performance on the Florida Teacher Certification Examination (FTCE). The predictor variables, lower-level GPA, upper-level GPA, ACT-English, ACT-Math, ACT-Social Science, ACT-Natural Science, and ACT-Composite were examined for their relationship to performance on the FTCE-Math, FTCE-Reading, FTCE-Professional Practices, and FTCE-Writing tests. Also examined was the relationship of the variables, race, sex, type of lower level college (community versus 4-year college), educational major, and campus where degree was completed (Tampa versus regional campus) to FTCE performance.

The study was based on the responses of approximately 400 graduates of the College of Education at the University of South Florida. Pearson correlations showed ACT-Composite and ACT-Social Science to be the best overall predictors of FTCE performance, and lower-level GPA the poorest.

With the predictor variables at hand, stepwise regression accounted for the most variance for criterion variables, FTCE-Math and FTCE-Reading. It accounted for the least variance for the criterion, FTCE-Writing. A cross-validation being a random split on the population of scores produced R^2 values comparable to those generated for the entire population, thereby confirming the accuracy of the regression results reported.

The Use of Student Background Variables, Act Scores, and GPA to Predict Performance on the Florida Teacher Certification Examination

1.0 Purpose

The purpose of the study was to examine the relationship of selected student background variables and College of Education entry variables to performance on the Florida Teacher Certification Examination (FTCE). The FTCE is composed of four tests (Mathematics, Reading, Professional Practices, and Writing). Passage of the FTCE is now a requirement for teacher certification in the State of Florida. The FTCE was given to candidates for certification in Florida for the first time in November, 1980. It was given again in April, August, and October 1981. Since the FTCE is relatively new, there has been little research to help college officials determine which variables might be used as predictors of FTCE performance (Villeme, Hall, and Phillippy, 1981).

2.0 Methodology

2.1 Predictor Measures

For several years, the College of Education at the University of South Florida has been requiring students to take the American College Test (ACT) during the first term of enrollment. Since either the ACT or the Scholastic Aptitude Test (SAT) is now required for all students prior to admission to teacher training programs throughout Florida, it was considered important to examine the validity of such tests for predicting performances on the four tests of the FTCE. Because only data on the ACT were available in relation to the FTCE, no SAT scores could be examined within the context of this study.

In addition to the ACT entry data, lower-level GPA and upper-level GPA were available on most students. Also available were the following student background variables: race, sex, education major, lower level college background (community versus 4 year college), and campus where B.A. degree was completed (main versus regional campus).

2.2 Procedures

Over the past several years, the College of Education at the University of South Florida has been requiring students to take the ACT during their first term of enrollment within the College. Graduates of State approved programs from the College of Education took the FTCE in November of 1980, April of 1981, August of 1981, or October of 1981.

By matching computer tapes from the College with tapes of the FTCE it was possible to identify 403 graduates who took both the certification exam and the ACT two years earlier. On 396 of these 197 subjects, GPA's were available on their first two years of college work. GPA's on 350 of these subjects were available on the last two years of college work.

Pearson correlations were run, generating concurrent validity coefficients among the predictor measures of lower-level GPA, upper-level GPA, ACT-English, ACT-Math, ACT-Social Science, ACT-Natural Science, and ACT Composite; concurrent validity coefficients among the Math, Reading, Writing and Professional Practices tests of the FTCE; and predictive validity coefficients on each of the above mentioned predictor measures for predicting performance on each of the tests of the FTCE.

Stepwide regression analyses were performed on most of the above described measures using three regression models as presented in the SAS User's Guide 1979 edition: Stepwise Regression, Forward Selection Regression, and Maximum R-Square Improvement Regression. Because upper level GPA was available on only 350 of the 403 subjects, that measure was excluded from the regression analyses. Also excluded was ACT Composite, since variance contributed by this score is included in the four individual ACT measures. To check the accuracy of the regression results generated for the population of scores, a cross-validation procedure recommended by Kerlinger & Pedhazur (1973) was employed. This involves splitting the scores into odd and even halves, then using one subsample as a screening sample and the other as a calibration sample to estimate the degree of shrinkage in the multiple correlation.

Using the General Linear Models procedure (SAS User's Guide, 1979) ANOVA's were run to determine the relationship of the background measures of race, sex, major, college background and campus to FTCE performance.

3.0 Results

3.1 Correlations

Mean and standard deviations on all correlated variables are presented in Table 1.

Pearson correlations on the variables are shown in Tables 2, 3, and 4. Table 2 contains intercorrelations among the seven predictor variables. Table 3 contains intercorrelations among the four criterion variables. Predictive validity coefficients are presented in Table 4.

TABLE 1

Mean and Standard Deviations
on GPA, ACT and Florida Teacher
Certification Examinations (FTCE)

Variable	N	Mean	SD
Lower-level GPA	396	2.92	.49
Upper-level GPA	350	3.16	.45
ACT-ENG	403	20.13	4.27
ACT-MTH	403	16.69	6.08
ACT-SOC-SC.	403	20.04	6.29
ACT-NS	403	21.13	5.44
ACT-COMP	403	19.52	4.48
[a]FTCE-MTH	428	222.76	14.52
[a]FTCE-READ	427	219.70	9.24
[a]FTCE-PROF	426	223.84	9.61
[b]FTCE-WRIT	428	7.68	1.60

[a]Passing score is 200.
[b]Passing score is 6.

The median correlation among the seven predictor variables (Table 2) was .44. If ACT-Composite is excluded, the median correlation drops to .39, with correlations ranging from .24 between lower-level GPA and ACT-Natural Science to .66 between ACT-Social Science and ACT-Natural Science. All correlations were significant at or beyond the .01 alpha level.

The median correlation among the four criterion variables (Table 3) was .47. The correlations ranged from .34 between FTCE-Professional Practices and FTCE-Writing to .55 between FTCE-Professional Practices and FTCE-Reading. All correlations were significant at or beyond the .01 alpha level.

The median correlation between the seven predictor variables and the four criterion variables (Table 4) was .43. The lowest predictive validity value was .20 between lower-level GPA and FTCE-Writing. The highest was .60 between ACT-Composite and FTCE-Math. Overall lower-level GPA was the poorest predictor of the criterion variables, generating a median coefficient of .21. The best predictor was ACT-Composite, with a median coefficient of .55. Next best was ACT-Social Science, with a median coefficient of .47. Overall, the seven predictor variables correlated highest with FTCE-Reading; the median predictive validity value for FTCE-Reading was .51. The predictor variables correlated lowest with FTCE-Writing, with a median predictive validity value of .33. All correlations in Table 4 were significant at or beyond the .01 alpha level.

TABLE 2

Incorrelations Among the Predictor Variables: GPA & ACT[a]

	ACT-ENG	ACT-MTH	ACT-SOCSC	ACT-NS	ACT-COMP	UPPER LEVEL-GPA
LOWER-LEVEL GPA	.26 (N=394)	.25 (N=394)	.26 (N=394)	.24 (N=394)	.31 (N=394)	.51 (N=343)
ACT-ENG		.42 (N=403)	.62 (N=403)	.56 (N=403)	.77 (N=403)	.38 (N=348)
ACT-MTH			.44 (N=403)	.55 (N=403)	.76 (N=403)	.35 (N=348)
ACT-SOCSC				.66 (N=403)	.85 (N=403)	.39 (N=348)
ACT-NS					.85 (N=403)	.37 (N=348)
ACT-COMP						.46 (N=348)

[a] All correlations are significant ($p<.01$).

TABLE 3

Intercorrelations Among the Criterion
Florida Teacher Certification Examinations (FTCE)[a]

Variables:	FTCE-READ	FTCE-PROF	FTCE-WRIT
FTCE-MTH	.52 (N=582)	.49 (N=581)	.36 (N=581)
FTCE-READ		.55 (N=582)	.44 (N=581)
FTCE-PROF			.34 (N=580)

[a] All correlations are significant ($p<.01$).

TABLE 4

Correlations Between Predictor Variables - GPA & Act - and Criterion Variables - Florida Teacher Certification Examinations (FTCE)[a]

Predictor Variables	Criterion Variables			
	FTCE-MTH	FTCE-READ	FTCE-PROF	FTCE-WRIT
LOWER-LEVEL GPA	.20 (N=393)	.22 (N=392)	.25 (N=391)	.20 (N=393)
ACT-ENG	.42 (N=400)	.52 (N=399)	.41 (N=398)	.43 (N=400)
ACT-MTH	.58 (N=400)	.36 (N=399)	.32 (N=398)	.25 (N=400)
ACT-SOCSC	.46 (N=400)	.53 (N=399)	.48 (N=398)	.36 (N=400)
ACT-NS	.46 (N=400)	.51 (N=399)	.43 (N=398)	.31 (N=400)
ACT-COMP	.60 (N=400)	.59 (N=399)	.51 (N=398)	.41 (N=400)
UPPER-LEVEL GPA	.40 (N=348)	.49 (N=347)	.49 (N=346)	.33 (N=347)

[a] All correlations are significant ($p<.01$).

3.2 Analyses of Variance

Arithmetic means on each of the tests of the FTCE are presented in Table 5 by race, sex, major, lower level college background, and campus where degree was completed. A General Linear Models ANOVA was used to determine the relationship between these student background factors and performance on each of the four tests of the FTCE. The results are summarized in Tables 6 through 9. Each table reports the model mean square and R^2 values pertinent to the prediction of performance on one of the FTCE tests. R^2 measures the amount of variation in the dependent variable that can be accounted for by all of the background variables in the model. Also included is the Type IV mean square value for each background variable. This value denotes the mean square due to adding that variable last in the model. The standard for statistical significance was set at the .01 alpha level.

As indicated in Table 6, the General Linear Models ANOVA for FTCE-Math produced an F of 6.10, which is significant at the .0001 apha level. The R^2 was .09, denoting that nine percent of the variance in FTCE-Math was accounted for by the five background variables. The Type IV ANOVA's on the five variables produced a significant F only for race and college.

As indicated in Table 7, the General Linear Models ANOVA for FTCE-Reading produced an F of 6.11, which was significant at the .0001 alpha level. The R^2 was .09. The Type IV ANOVA's on the five background variables produced significant F's only for race and campus.

TABLE 5

Mean FTCE Performance
by Sex, Major, Lower Level College Background
and Campus Where Degree Was Completed

Variable	N	Math M	Reading M	Prof. Ed. M	Writing M
Race					
Black & Hispanic	24	210.04	213.79	215.83	6.88
White & Other	376	224.15	220.35	224.76	7.78
Sex					
Male	50	224.36	219.36	220.74	7.40
Female	350	223.15	220.05	224.72	7.78
Major					
Elementary	198	223.38	219.64	224.72	7.65
Exceptional Ed.	97	223.49	219.03	224.95	7.63
Other	105	222.97	221.41	221.40	7.97
Lower Level College					
Community	222	221.86	219.14	224.58	7.66
4 year	178	225.10	220.98	223.78	7.81
Campus					
Regional	84	226.68	222.82	228.18	8.05
Tampa	316	222.41	219.20	223.17	7.65

TABLE 6

General Linear Models ANOVA Summary Table
for FTCE-Math by Race, Sex, Major, College Background, and Camp

Source	df	MS	F	P	R^2
Model	6	1134.56	6.10	.0001	.09
Error	393	186.04			

Source	df	Type IV MS	F	P
Race	1	4021.90	21.62	.0001
Sex	1	72.33	39	NS
Major	2	39.15	.21	NS
College	1	1330.81	7.15	.008
Campus	1	1132.61	6.09	NS

TABLE 7

General Linear Models ANOVA Summary Table
for FTCE-Reading by Race, Sex, Major, College Background, and Campus

Source	df	MS	F	P	R^2
Model	6	464.88	6.11	.0001	.09
Error	393	76.06			

Source	df	Type IV MS	F	P
Race	1	720.47	9.47	.002
Sex	1	136.13	1.79	NS
Major	2	281.40	3.70	NS
College	1	423.18	5.56	NS
Campus	1	1160.79	15.26	.0001

As indicated in Table 8, the General Linear Models ANOVA for FTCE-Professional Practices produced an F of 8.67, which was significant at the .0001 apha level. The R^2 was .12. The Type IV ANOVA's on the five background variables produced significant F's only for race and campus.

As indicated in Table 9, the General Linear Models ANOVA for FTCE-Writing produced an F of 3.68, which was significant at the .002 alpha level. The R^2 was .05. None of the Type IV ANOVA's on the five background variables produced significiant F's.

3.3 Regression

The three stepwise regression procedures (Stepwise, Forward Selection, and Maximum R^2) produced highly similar results. Therefore, only the results of the Stepwise procedure are reported. In the Stepwise procedure, predictor variables were entered only if they had an F-statistic significant at or beyond the .15 alpha level. The results of the regression analyses for each criterion variable are summarized in Table 10.

As indicated in Table 10, the regression system accounted for the most variance for the criterion FTCE-Math (R^2 =.40) and the next most variance for the criterion FTCE-Reading (R^2 = .37). The regression system accounted for the least variance for the criterion, FTCE-Writing (R^2 = .21). Across across the four criterion variables, no one predictor variable was clearly dominant.

TABLE 8

General Linear Models ANOVA Summary Table
for FTCE-Professional Practices by Race, Sex, Major,
College Background, and Campus

Source	df	MS	F	P	R^2
Model	6	713.21	8.67	.0001	.12
Error	393	82.27			

Source	df	Type IV MS	F	P
Race	1	1725.01	20.97	.0001
Sex	1	297.85	3.62	NS
Major	2	215.61	2.62	NS
College	1	.12	.00	NS
Campus	1	864.24	10.50	.001

TABLE 9

General Linear Models ANOVA Summary Table
for FTCE-Writing by Race, Sex, Major, College Background, and Campus

Source	df	MS	F	P	R^2
Model	6	9.36	3.68	.002	.05
Error	393	2.54			

Source	df	Type IV MS	F	P
Race	1	14.55	5.73	NS
Sex	1	13.89	5.47	NS
Major	2	9.41	3.70	NS
College	1	2.80	1.10	NS
Campus	1	15.45	6.08	NS

TABLE 10

Stepwise Regression Results on Each Criterion Variable

(N = 390)

Criterion Variable	Variable Added*	R Square
FTCE-MTH	ACT-MTH	.34
	ACT-SOCSC	.39
	ACT-ENG	.40
FTCE-READ	ACT-SOCSC	.29
	ACT-ENG	.35
	ACT-NS	.37
FTCE-PROF	ACT-SOCSC	.23
	ACT-NS	.26
	GPA	.27
	ACT-ENG	.28
FTCE-WRIT	ACT-ENG	.19
	ACT-SOCSC	.21

*Predictor variables were entered only if they had an F-statistic significant at or beyond the .15 alpha level.

ACT-Math was foremost for FTCE-Math; ACT-Social Science was foremost for FTCE-Reading and FTCE-Professional Practices; and ACT-English was foremost for FTCE-Writing. On none of the four FTCE criterion tests was ACT-Natural Science or lower-level GPA the major contributor.

The cross-validation produced differences between the R^2 values of the screening sample and the R^2 values of the calibration sample that were quite small (within .03 points), thereby supporting the stability of the regression results reported.

4.0 Discussion and Conclusions

Based on the correlational analyses, ACT-Composite and ACT-Math showed the greatest validity for predicting success on FTCE-Math. ACT-Composite also showed the greatest validity for predicting success on FTCE-Reading. ACT-Composite, upper level GPA, and ACT-Social Science showed the greatest validity for predicting FTCE-Professional Practices. ACT-English showed the greatest validity for predicting success on FTCE-Writing.

As a set, the five student background variables appeared most useful for predicting FTCE-Professional Practices performance although even here the R^2 value was quite small in size (.12). Across the four FTCE tests, race appeared most consistently as a contributor to prediction. Sex and major were not signficant contributors for any of the four FTCE tests.

Generally, the regression data available for this study do not hold up well in predicting success on the Professional Practices and Writing tests of the FTCE. The information that is tested on the Professional Practices test is primarily that which is taught in courses within the College of Education. Therefore, it seems reasonable that lower-level GPA or ACT tests completed prior to taking these courses would not contribute highly to predicting scores on this criterion test. It is also understandable that predicting how well a person will do on a writing test such as FTCE-Writing, using an objective predictor test like the ACT would be rather difficult. The question of reliability in grading the writing test may also affect the predictability of the results.

The moderately strong correlation of .49 between upper-level GPA and the FTCE-Professional Practices performance is encouraging. This would be expected since upper-level GPA reflects competencies gained in professional education courses and these competencies are essentially what is measured on the FTCE-Professional Practices test.

Overall, it appears that the College of Education entry variables herein examined are most promising for the prediction of Mathematics & Reading performance on the Florida Teacher Certification Examination. The student background variables included in the study appear far less promising than the entry variables for predicting FTCE performance.

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